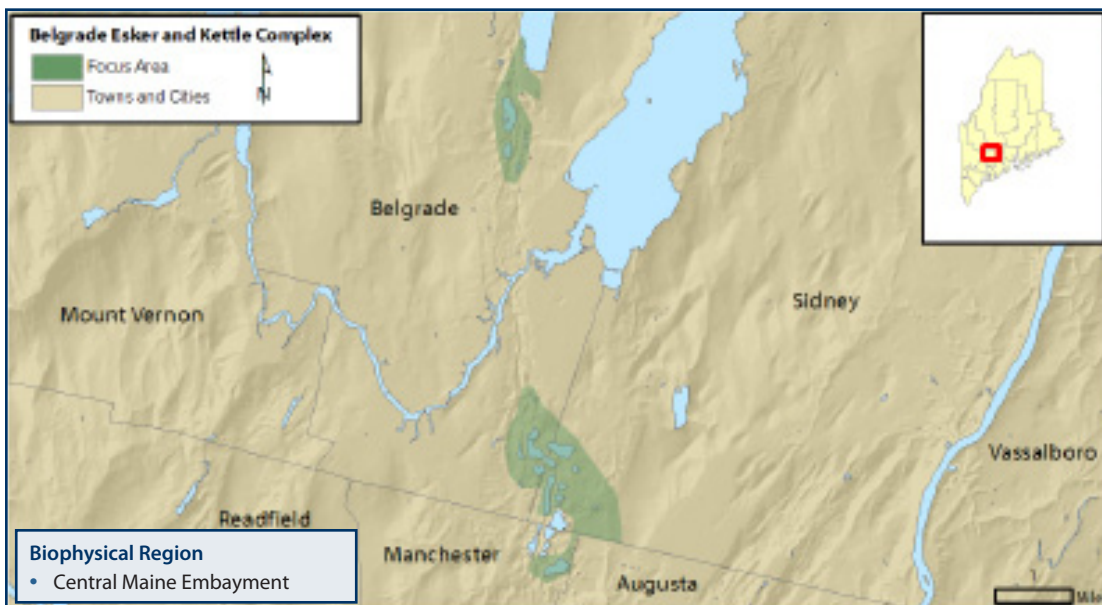
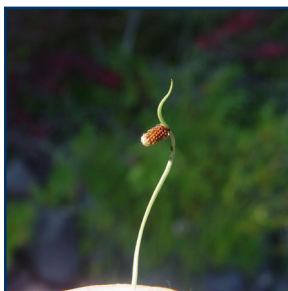
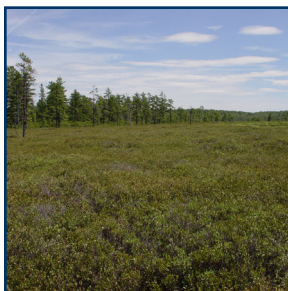


Belgrade Esker and Kettle Complex



WHY IS THIS AREA SIGNIFICANT?

This focus area extends from Great Pond's Foster Point in Belgrade to Tyler Pond in North Augusta. Geologists have long considered it one of the very best esker systems in Maine. It includes fine examples of kettlehole ponds and wetlands that are associated with the esker system. Most of the esker itself has now been removed from the landscape due to sand and gravel extraction. However, a few portions that are worth conservation attention remain. The largest are the Colby – Marston Bog and environs at the north end of the system, and the Penney Pond to Tyler Pond area at the south end of the system.

OPPORTUNITIES FOR CONSERVATION

- » Educate recreational users about the ecological and economic benefits provided by the focus area.
- » Encourage best management practices for forestry, vegetation clearing, and soil disturbance activities near significant features.
- » Maintain intact forested buffers along water bodies and wetlands.
- » Work with landowners to encourage sustainable forest management and mining practices on remaining privately owned forest lands.
- » Work with willing landowners to secure permanent conservation status for unprotected significant features.

For more conservation opportunities, visit the Beginning with Habitat Online Toolbox: www.beginningwithhabitat.org/toolbox/about_toolbox.html.

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Rare Plants
Dwarf Bulrush
Fall Fimbry

Rare and Exemplary Natural Communities
Black Spruce Bog
Kettlehole Bog-pond Ecosystem
Leatherleaf Bog

Significant Wildlife Habitats
Deer Wintering Area

Public Access Opportunities
• Tyler Pond, MBPL



Tyler Pond, Maine Natural Areas Program

FOCUS AREA OVERVIEW

Colby – Marston Bog and environs: The Colby – Marston Bog is a classic example of a glacial kettlehole filled with “kettlehole bog” vegetation. (Technically, it is actually a fen since the vegetation is in contact with the groundwater.) The floating mat includes Leatherleaf Boggy Fen, Sedge – Leatherleaf Fen Lawn, and Mountain Holly – Alder Woodland Fen communities, and small areas of Spruce – Larch Wooded Bog near the upland edge. The gradations from one vegetation type to another are clear. Adjacent to Colby – Marston Bog itself are other kettles (on which little on-the-ground information is available), including one deep dry one. Portions of the esker are well preserved here because the Foster Point Road runs along it.

Hamilton Pond, across Rt. 27 from the Colby – Marston Bog, is a deep kettlehole pond with little development of bog vegetation, except for some areas in the southern lobes. The rare alga-like pondweed (*Potamogeton confervoides*), an aquatic plant, has been found here.

The kettleholes east of Stuart Pond are also considered an exemplary Kettlehole Bog – Pond Ecosystem. The vegetation types are similar to those in the Colby – Marston Bog, but the

setting is somewhat different: this is a chain of small kettleholes strung together alongside the esker. While the wetlands themselves are relatively undisturbed here, the adjacent uplands have been severely degraded, and for this reason these kettleholes should be considered somewhat lower in quality than the Colby – Marston and Penney Pond – Tyler Pond kettleholes.

Penney Pond to Tyler Pond: An impressive array of steep-sloped eskers, kettlehole bogs and ponds, and forested/shrubby peatlands covers this area straddling the Belgrade – Manchester line. North of the Summerhaven Road, the Penney Pond – Joe Pond area is a virtually undeveloped 500+ acre tract. Much of the upland forest has been selectively logged at various intervals over the years; logging has been relatively light, and remaining forest is comparatively intact. Some areas of steep slope are intact, mature hemlock slopes with trees up to 24 inches in diameter. Chamberlain, Wellman, Bean and Emery Ponds are entirely undeveloped; Penney Pond has a single (seasonal) house on it; and Gould Pond has a few houses at the south end. Most of the ponds have shrubby/boggy borders and mucky substrate. Many have evidence of beaver activity. Small (a few acres) but undisturbed kettlehole

bog pockets exist throughout the area. East of Bean Pond is a wooded peatland with scattered red pine (*Pinus resinosa*), along with the more typical larch (*Larix laricina*) and white pine (*Pinus strobus*). The intact array of hemlock slopes, mixed forests, pristine ponds and undisturbed peatlands is noteworthy for Central Maine.

South of the Summerhaven Road, the ponds are more developed, except for Tyler Pond and its environs which is in state ownership. The Tyler Pond area (126 acres) is mostly ecologically similar to the Penney Pond – Joe Pond area, although with less diversity of wetland vegetation. Tyler Pond itself differs somewhat in that it has no peat development and the sandy shores support different aquatic species than are found at the other ponds here. Two rare pondshore species that are typically associated with sandy rather than mucky substrates have been found here, the dwarf bulrush (*Lipocarpus micrantha*) and fall fimbry (*Fimbristylis autumnalis*).

Like all of the Belgrade Esker and Kettle Complex, the Penney Pond to Tyler Pond area is considered geologically as well as biologically important.

RARE AND EXEMPLARY NATURAL COMMUNITIES

Kettlehole Bog-Pond Ecosystem: Kettlehole bogs are flat peatlands in “kettles,” circular or elliptical depressions, usually deeper than they are wide, formed in morainal, glaciofluvial, or coastal plain deposits by the melting of buried ice blocks. The centers of these bowl-shaped basins may be a floating peatland mat or open water ringed by peatland. Where the surface of the floating mat is sufficiently elevated by peat accumulation to be free from contact with the mineral-enriched pond water, vegetation typical of nutrient-poor conditions develops. In the southernmost part of the state, kettlehole vegetation may include species of more southern affinity such as Atlantic white cedar, sweet pepperbush, and arrow-arrum.

Black Spruce Bog: This open canopy peatland type is characterized by black spruce and/or larch trees over typical bog vegetation of heath shrubs, graminoids, and peat mosses. It is the most common type of ‘forested bog’ in Maine. Canopy closure is usually 20-50% and occasionally ranges up to 85%. Black spruce is usually dominant, but in some cases larch (or rarely fir) may be more abundant. Red maple may be a component in somewhat more minerotrophic portions, and white pine may occur on hummocks. The shrub layer, including small trees, is usually well developed (>30% cover). Labrador tea and three-seeded sedge are characteristic species. The bryoid layer has close to 100% cover and is dominated by peat mosses; sparse reindeer lichens may occur.

Black spruce bogs generally occur as part of larger peatlands. Maintaining the hydrologic integrity of the entire wetland with upland buffers is key. The trees mostly remain small and have limited economic use. Several known sites are in public ownership.

Ecological Services of the Focus Area

- Sediment/nutrient retention
- Floodwater retention
- Serves as Deer Wintering Area

Economic Contributions of the Focus Area

- Scenic/viewshed
- Groundwater recharge
- Serves as a valuable recreational resource for local residents.
- Education/tourism



Black Spruce Bog, Maine Natural Areas Program

Bogs with scattered tall larch or snags provide suitable perching and foraging habitat for the rare olive-sided flycatcher. Similarly, the three-toed woodpecker inhabits bogs with large numbers of dead trees. Palm warblers, common yellowthroats, and northern waterthrushes are specialists that breed primarily in this community type.

Leatherleaf Bog: This peatland vegetation type is dominated by leatherleaf and other low heath shrubs. Most of the vegetation is usually less than 1 m tall, although taller shrubs including black huckleberry, maleberry, and sweetgale may be sporadic. In the dwarf shrub/herb layer, leatherleaf is always present and usually dominant (30-60% cover at most sites). Other heath shrubs and sedges are mixed in with the leatherleaf. Graminoid cover is usually less than 30%. Typical bog plants including pitcher plant, sundew, and small cranberry are scattered on the peat moss substrate. Trees, if present at all, are <15% total cover.

This type is well represented in Maine and is fairly stable in extent, with several examples on public lands and private conservation lands. Some sites in kettlehole settings have been degraded by adjacent gravel mining. Changes to bog hydrology through impoundment or draining could lead to vegetation changes. Slow vegetation growth rates, due to the nutrient-poor environment, mean slow recovery from physical disturbances, such as recreational trail use. If disturbance, such as foot traffic, is a necessity, traversing during frozen conditions or using boardwalks can minimize impacts.

CHARACTERISTIC SPECIES

Dwarf Bulrush (*Lipocarpa micrantha*) resembles the closely related bull-rushes (*Schoenoplectus spp.*), but as indicated by its name, is dwarfed, reaching 15 cm high at most, with drooping, narrow leaves. The spikes, 2-3 per stem, are 2-6 mm long, oval, covered with brown scales, and appear to emerge from the side of the stem because one of the bracts is erect and resembles a continuation of the stem. Also superficially similar is the sedge *Fimbristylis autumnalis*, which has small (3-7 mm long), egg-shaped fruiting heads (spikes) but lacks the leaf-like bract of dwarf bulrush. Heavy recreational use of the sandy habitats where this occurs has degraded the habitat in some locations and continued use will be detrimental to the plant populations.

Fall Fimbry (*Fimbristylis autumnalis*) is a tiny sedge that is easily overlooked. It grows in clusters or mats of plants 5-8 cm tall. Leaves are thread-like. The fruiting heads (spikes) are small (3-7 mm long) and egg-shaped and borne in clusters atop the short stems. *Fimbristylis* could be confused with small individuals of the related *Bulbostylis capillaris*; *Fimbristylis autumnalis* has flat stems and the larger leaves are wider than 1.0 mm, while *Bulbostylis capillaris* has capillary stems and leaves narrower than 0.5 mm. Also superficially similar is the tiny sedge *Lipocarpa micrantha* (very rare in Maine), which differs in having a leaf-like bract continuing above the spikes so that the spikes look like they emerge from the side of the stem.

CONSERVATION CONSIDERATIONS

- » Sand and gravel mining pose the greatest threat to these ecosystems, and have already degraded portions of them. Sand and gravel extraction in the Belgrade area has accelerated in recent years.
- » Less pervasive is degradation from incidental uses related to the increasing residential development in the area. Buffers can play a major role in protection here. ORV use of the area is locally heavy, and care needs to be taken that ORVs stay on existing trails and remain out of all wetlands when the ground is not frozen.

- » An adequate buffer should be retained between developed lots or timber harvest areas and the kettleholes, including their sloping sides and any wetlands within them. The state minimum shoreland zoning standards restrict harvest and clearing within 250' of the wetland border. Because different species can have different buffering requirements, larger buffers will afford better protection to the whole suite of plants and animals that make up these systems. Any timber harvesting within and adjacent to the wetland should be implemented with strict adherence to state or local Shoreland Zoning guidelines and Maine Forest Service Best Management Practices.
- » Improperly sized culverts and other stream crossing structures can impede movement of fish and aquatic invertebrates effectively fragmenting local aquatic ecosystems and ultimately leading to local extirpation of some species. Future management should maintain or restore the sites natural hydrology.
- » Invasive plants and aquatic organisms have become an increasing problem in Maine and a threat to the state's natural communities. Disturbances to soils and natural vegetation and introductions of non-native species to terrestrial and aquatic habitats can create opportunities for colonization. Landowners and local conservation groups should be made aware of the potential threat of invasive species, of methods to limit establishment, and/or of appropriate techniques for removal. For more information on invasive plants visit: <http://www.maine.gov/doc/nrimc/mnap/features/invasives.htm>.
- » Appropriate conservation strategies include tree growth and open space treatments, conservation easements, and fee ownership. Monitoring recreational use will be an important component of conservation as well.

RARE SPECIES AND EXEMPLARY NATURAL COMMUNITIES OF THE FOCUS AREA

	Common Name	Scientific Name	State Status*	State Rarity Rank	Global Rarity Rank
Plants	Dwarf Bulrush	<i>Lipocarpa micrantha</i>	T	S1	G5
	Fall Fimbry	<i>Fimbristylis autumnalis</i>	T	S2S3	G5
Natural Communities	Black Spruce Bog	Spruce - larch wooded bog		S4	G3G5
	Kettlehole Bog-Pond Ecosystem	Kettlehole bog-pond ecosystem		S4	GNR
	Leatherleaf Bog	Leatherleaf boggy fen		S4	G5

State Status*

- E** Endangered: Rare and in danger of being lost from the state in the foreseeable future, or federally listed as Endangered.
- T** Threatened: Rare and, with further decline, could become endangered; or federally listed as Threatened.
- SC** Special Concern: Rare in Maine, based on available information, but not sufficiently rare to be Threatened or Endangered.

**State status rankings are not assigned to natural communities.*

State Rarity Rank

- S1** Critically imperiled in Maine because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres).
- S2** Imperiled in Maine because of rarity (6–20 occurrences or few remaining individuals or acres) or because of other factors making it vulnerable to further decline.
- S3** Rare in Maine (on the order of 20–100 occurrences).
- S4** Apparently secure in Maine.
- S5** Demonstrably secure in Maine.

Global Rarity Rank

- G1** Critically imperiled globally because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres) or because some aspect of its biology makes it especially vulnerable to extirpation.
- G2** Globally imperiled because of rarity (6–20 occurrences or few remaining individuals or acres) or because of other factors making it vulnerable to further decline.
- G3** Globally rare (on the order of 20–100 occurrences).
- G4** Apparently secure globally.
- G5** Demonstrably secure globally.